DEQ Release Notes

April 12, 2017

1. Introduction

This is a summary of changes to DEQ in recent releases (Version 6.0 on February 26, 2016; Version 6.1 on July 27, 2016; and Version 7.0 on April 12, 2017). These changes include updates to data, algorithms and sources as well as improvements to functionality and appearance.

2. Terminology (v. 7.0)

Some terminology has been updated for clarity.

a. **'Project'** has replaced 'Fleet'. 'Project' is more descriptive than 'Fleet' and more consistent with EPA's grant terminology.
b. **'Upgrade'** has replaced 'Technology'. 'Upgrade' is more all-encompassing than 'technology' or 'retrofit' and more obviously includes things like replacements, cleaner fuels, and tires.
c. **'Onroad'** has replaced 'On Highway'. 'Onroad' better describes where these vehicles are used.
d. **'Railyard'** has been split out of the old 'Rail' and includes non-locomotive, rail-related nonroad equipment. The remaining part of the old 'Rail' is now called **'Locomotive'**.

3. Look and Feel (v. 7.0)

The look and feel of DEQ has been updated to make it more intuitive and easier to use.

a. **Modern grid format** provides a quick view of Projects, Vehicle Groups, and Upgrades and makes it easier to find a specific project. Grid headers can be used for sorting.
b. **Group and Upgrade options** are all displayed, providing a complete menu of choices on the Group or Upgrade screen.
c. **Upgrade** details are now displayed and editable
d. **Scalable display** allows for viewing on computers, tablets, and mobile phones.
e. **EPA website format** has been integrated into DEQ's redesign.

4. Onroad Vehicles

Onroad emission factors, default values, remaining lives, vehicle types, and other inputs have been updated using MOVES2014. (v. 6.1)

a. **Emission factors** for onroad vehicles are now generated at the national level. The selection of a state no longer affects the calculations. (v. 6.1)
b. **Emission categories** for onroad vehicles are now divided by vehicle type into running, idling, and hoteling emissions (long haul combination only). (v. 6.1)
c. **Default values** for onroad fuel consumption, VMT, idling hour and hoteling hours have been updated or added based on data from MOVES2014. (v. 6.1)

d. **Remaining life** is median life minus the age of the engine at the time of the upgrade. It is used to calculate lifetime emissions and reductions. Median life for onroad engines has been updated to 19 years based on data from MOVES2014 (v. 6.1). Remaining life is now displayed and editable, up to a maximum life of 30 years. (v. 7.0)
e. **Vehicle types** for onroad have been updated to match the vehicle types used in MOVES2014. (v. 6.1)

5. Nonroad Engines

Nonroad emission factors are now generated within DEQ using data, factors and logic from the NONROAD2008 model and regulatory documents. Previously they came from NONROAD output that was converted into factors that could be used in DEQ. Some horsepower and upgrade year combinations were missing, but all combinations are now available, removing the 'holes' that existed previously. (v. 6.0)

a. **Sulfur adjustment** has been added to the calculation for PM baseline emissions to adjust for the use of ULSD, which was not the standard when the older regulations were written. (v. 6.0)
b. **Horsepower** for nonroad engines is now an open field, allowing the user to enter specific data rather than selecting from a limited list. (v. 6.0)
c. **Engine tier** is now user-entered instead of assumed. Users selecting Tier 4 must enter the engine model year; for other tiers, if only the tier or the model year is entered, DEQ will assign the other. (v. 6.0)
d. **Remaining life** is median life minus the age of the engine at the time of the upgrade. It is used to calculate lifetime emissions and reductions. Maximum lives for nonroad engines have been updated to better reflect real world data (v. 6.0). Remaining life is now displayed and editable, up to a maximum of 20, 30 or 40 years depending on HP. (v. 7.0)
e. **Replacement engine fields** for tier (v. 6.1) and horsepower (v. 7.0) have been added to the engine specs.

6. Locomotive Engines

Locomotive emission factors are now generated within DEQ, using data, factors and logic from the NONROAD2008 model and regulatory documents. Previously they came from NONROAD output that was converted into factors that could be used in DEQ. Some horsepower and upgrade year combinations were missing, but all combinations are now available, removing the 'holes' that existed previously. (v. 6.0)

a. **Locomotives** are now their own vehicle type and no longer part of Nonroad. (v. 7.0)
b. **Duty cycle** options are now available for line haul engines, which can be used in either line haul or switch capacity. (v 7.0)
c. **Load factors,** which reflect actual horsepower usage, have been calculated as 8.2715% for switch and 26.891% for line haul. They are included in baseline emission calculations

and result in emissions that are either 8.27% or 26.89% of the baseline emissions calculated prior to v 6.0. Passenger engines also use a load factor of 23.891%. (v 7.0)

d. **Horsepower** for locomotive is now an open field, allowing the user to enter specific data rather than selecting from a limited list. (v. 6.0)
e. **Engine tier** can now be user-entered instead of assumed. (v. 6.0)
f. **Remaining life** is median life minus the age of the engine at the time of the upgrade and is used to calculate lifetime emissions and reductions. Median lives for locomotive engines have been updated using *Regulatory Impact Analysis: Control of Emissions of Air Pollution from Locomotive Engines and Marine Compression Ignition Engines Less than 30 Liters Per Cylinder (EPA420-R-08-001a, May 2008).* Remaining life is now displayed and editable. (v. 7.0)
g. **Replacement engine tier and horsepower** fields have been added to the engine specs. (v. 7.0)

7. Marine Engines

Marine emission factors are now generated in DEQ, using data, factors and logic from regulatory documents.

a. **Sulfur adjustment** has been added to the calculation for PM baseline emissions to adjust for the use of ULSD, which was not the standard when the older regulations were written. (v. 7.0)
b. **Horsepower** for marine is now an open field, allowing the user to enter specific data rather than selecting from a limited list. (v. 7.0)
c. **Horsepower and displacement combinations** now include only combinations for which DEQ has data, removing some combinations that could previously be selected. (v. 6.1)
d. **Engine tier** can now be user-entered instead of assumed. (v. 6.0)
e. **Remaining Life** is median life minus the age of the engine at the time of the upgrade and is used to calculate lifetime emissions and reductions. Median lives for marine engines have been updated using *Regulatory Impact Analysis: Control of Emissions of Air Pollution from Locomotive Engines and Marine Compression Ignition Engines Less than 30 Liters Per Cylinder (EPA420-R-08-001a, May 2008).* Remaining life is now displayed and editable. (v. 7.0)
f. **Replacement engine tier and horsepower** fields have been added to the engine specs. (v. 7.0)

8. Upgrades

a. **Upgrade options** now list only upgrades that have been EPA- or CARB-verified. (v. 6.1)
b. **Emission reduction percentages** have been updated to match verification data. These fields may be edited. In most cases, an 'other' option is available so the user can input technologies and reduction percentages that are not specified in DEQ. (v. 6.1)
c. **Idle control strategies** reduction factors have been updated. (v. 6.1)
d. **Engine or vehicle replacements**

1. Now include options for hybrids and electrics. (v. 7.0)
2. For fuels other than ULSD, B5 or B20: DEQ uses ULSD emission factors as surrogates until better data is available. These fields are editable by the user. (v. 7.0)
3. For electric engines: DEQ assumes 100% emission reductions with no offset for power plant emissions. (v. 7.0)

e. **B5 and B20** reduction factors for onroad vehicles switching from diesel are based on fuel-specific data from MOVES2014. (v. 6.1)

f. **Diesel-equivalent gallons,** which are used for CO_2 emission calculations, have been updated to align with data from Alternative Fuels Data Center of the Department of Energy (http://www.afdc.energy.gov/fuels/fuel_comparison_chart.pdf). (v. 7.0)

g. **Engine upgrade kits** are now a separate option and allow for user-entered reductions based on verified or certified data. (v. 7.0)

9. How DEQ works

a. **For upgrades other than engine or vehicle replacements:**
   1. DEQ calculates emissions for the baseline engine.
   2. DEQ multiplies the baseline emissions by the EPA- or CARB-verified (or user-entered) emission reduction factors.
   3. The results are the estimated emission reductions from the upgrade.

b. **For engine or vehicle replacements:**
   1. DEQ calculates emissions for the baseline and replacement engines.
   2. DEQ subtracts replacement emissions from baseline emissions and divides the difference by baseline emissions to calculate the emission reduction factors.
   3. DEQ multiplies the baseline emissions by the calculated emission reduction factors.
   4. The results are the estimated emission reductions from the replacement.